CSE291
Topics in Computer Graphics
Mesh Animation

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Final projects presentation
- Monday Dec. 4, 6pm, EBU3B 4140
- 10 minutes each
- Food and drinks provided

Geometric deformation

Reference position
(undeformed)

Deformed shape,
placement field $u(x)$

Simulation step

$\mathbf{u}_r \rightarrow \nabla \mathbf{u}_r \rightarrow \mathbf{\varepsilon}_r \rightarrow \mathbf{\sigma}_r \rightarrow \mathbf{f}_r \rightarrow \mathbf{u}_{r+\Delta t}$
displacements
derivatives
strains
stresses
forces
integration

Strain and stress

- Green's strain tensor

$$\mathbf{\varepsilon} = \mathbf{J}^T \mathbf{J} - \mathbf{I}$$

- Linear stress-strain relationship
  (generalized Hooke’s law)

$$\mathbf{\sigma} = \mathbf{C} \mathbf{\varepsilon}$$
<table>
<thead>
<tr>
<th>Forces</th>
<th>Discretization</th>
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<tbody>
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<td>• Negative gradient of strain energy density</td>
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<tr>
<td>[ f_i = -\sigma \nabla u_i \epsilon ]</td>
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